

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the present application.

Listing of Claims:

Claim 1 (withdrawn): A method for continuous amplification of DNA, the method repeating DNA amplification reactions continuously by:

with a recirculation path and a pump furnished in the recirculation path, feeding unidirectionally through the recirculation path a reaction mixture containing DNA fragments and a reagent solution, held in a reaction-mixture tank;

sending the reaction mixture within the recirculation path by way of, in order, a denaturing isothermal tank wherein a temperature for dissolving apart the DNA's double strands is maintained, an annealing isothermal tank wherein a temperature at which primers contained in the reagent solution anneal to the DNA fragments is maintained, and an elongation isothermal tank wherein a temperature at which complementary chains are extended continuously onto the primers is maintained; and

with heat-exchange fluids within the isothermal tanks, maintaining the reaction mixture for predetermined times at predetermined temperatures, and subsequently recirculating the reaction mixture into the reaction-mixture tank.

Claim 2 (withdrawn): The DNA continuous amplification method set forth in claim 1, wherein the amplification reactions are performed by making time for heat-exchange in the denaturing isothermal tank a reference time, and setting individual heat-exchange times in the annealing isothermal tank and the elongation isothermal tank as multiples of the reference time.

Claim 3 (withdrawn): A method for continuous amplification of DNA, the method repeating DNA amplification reactions continuously by:

circuit-feeding unidirectionally through an endless recirculation path, using a pump provided therein, a reaction mixture containing DNA fragments and a reagent solution, held within the recirculation path;

circulating the reaction mixture within the recirculation path by way of, in order, a denaturing isothermal tank wherein a temperature for dissolving apart the DNA's double strands is maintained, an annealing isothermal tank wherein a temperature at which primers contained in the reagent solution anneal to the DNA fragments is maintained, and an elongation isothermal tank wherein a temperature at which complementary chains are extended continuously onto the primers is maintained; and

with heat-exchange fluids within the isothermal tanks, maintaining the reaction mixture for predetermined times at predetermined temperatures.

Claim 4 (currently amended): An apparatus for continuous amplification of DNA, comprising:

a reaction-mixture tank for holding a reaction mixture containing DNA fragments and a reagent solution;

a denaturing isothermal tank made up of a container body for holding a heat-exchange fluid, a heating device for heating the heat-exchange fluid to, and retaining it at, a prescribed temperature for dissolving apart the DNA's double strands, and a stirring device for stirring the heat-exchange fluid;

an annealing isothermal tank made up of a container body for holding a heat-exchange fluid, a heating device for heating the heat-exchange fluid to, and

retaining it at, a prescribed temperature at which primers contained in the reagent solution anneal to the DNA fragments, and a stirring device for stirring the heat-exchange fluid;

an elongation isothermal tank made up of a container body for holding a heat-exchange fluid, a heating device for heating the heat-exchange fluid to, and retaining it at, a prescribed temperature at which complementary chains are extended continuously onto the primers, and a stirring device for stirring the heat-exchange fluid;

an endless recirculation-path system through which the reaction mixture in the reaction-mixture tank is fed and guided, the recirculation-path system including a coiled heat-exchange section immersed into the denaturing isothermal tank, a coiled heat-exchange section immersed into the annealing isothermal tank, and a coiled heat-exchange section immersed into the elongation isothermal tank, the recirculation-path system therein being arranged to circuit from and back to the reaction-mixture tank by way of the respective coiled sections immersed into the denaturing, annealing and elongation isothermal tanks and connected by intervening out-of-tank sections; and

an intermittent-feed pump working to circuit-feed the reaction mixture unidirectionally through said recirculation-path system to maintain the reaction mixture for timed intervals at the prescribed temperatures determined by the heat-exchange fluids in the isothermal tanks.

Claim 5 (canceled)

Claim 6 (previously presented): The DNA continuous amplification apparatus set forth in claim 4, wherein each heating device includes a pump for

circuit-feeding the heat-exchange fluid in between the container body and the heating device, and a heat source for heating the heat-exchange fluid to and retaining it at prescribed temperatures, wherein said heating device supplies the heat-exchange fluid to said container body.

Claim 7 (original): The DNA continuous amplification apparatus set forth in claim 4, wherein a plurality of said recirculation-path systems in parallel is provided along with said pump between the reaction-mixture tank and said container bodies.

Claim 8 (canceled)

Claim 9 (original): The DNA continuous amplification apparatus set forth in claim 6, wherein a plurality of said recirculation-path systems in parallel is provided along with said pump between the reaction-mixture tank and said container bodies.

Claim 10 (original): The DNA continuous amplification apparatus set forth in claim 4, further comprising:

a plurality of sets of said denaturing isothermal tank, said annealing isothermal tank, and said elongation isothermal tank; and

a plurality of said recirculation-path systems in parallel, provided along with said pump between the reaction-mixture tanks and the isothermal tanks of said plurality of sets.

Claim 11 (original): The DNA continuous amplification apparatus set forth in claim 5, further comprising:

a plurality of sets of said denaturing isothermal tank, said annealing isothermal tank, and said elongation isothermal tank; and

a plurality of said recirculation-path systems in parallel, provided along with said pump between the reaction-mixture tanks and the isothermal tanks of said plurality of sets.

Claim 12 (original): The DNA continuous amplification apparatus set forth in claim 6, further comprising:

a plurality of sets of said denaturing isothermal tank, said annealing isothermal tank, and said elongation isothermal tank; and

a plurality of said recirculation-path systems in parallel, provided along with said pump between the reaction-mixture tanks and the isothermal tanks of said plurality of sets.

Claims 13-17 (canceled)